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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/663,051

09/15/2003

Gordon Ma

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7590

09/08/2004

R. William Beard, Jr.
Baker Botts L.L.P.
One Shell Plaza
910 Louisiana
Houston, TX 77002

EXAMINER

LEE, EUGENE

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/663,051 | MA ET AL. | |
| | Examiner | Art Unit | |
| | Eugene Lee | 2815 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 September 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/12/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the LOCOS process (claims 11, 25, and 39) and masked ion implant (claims 14, 28, and 40) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 7 and 8 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 7 reiterates a limitation that is already stated in parent claim 4 and therefore does not further limit the claim.

Claim 8 reiterates a limitation that is already stated in parent claim 5 and therefore does not further limit claim 5.

Claim Rejections - 35 USC § 102

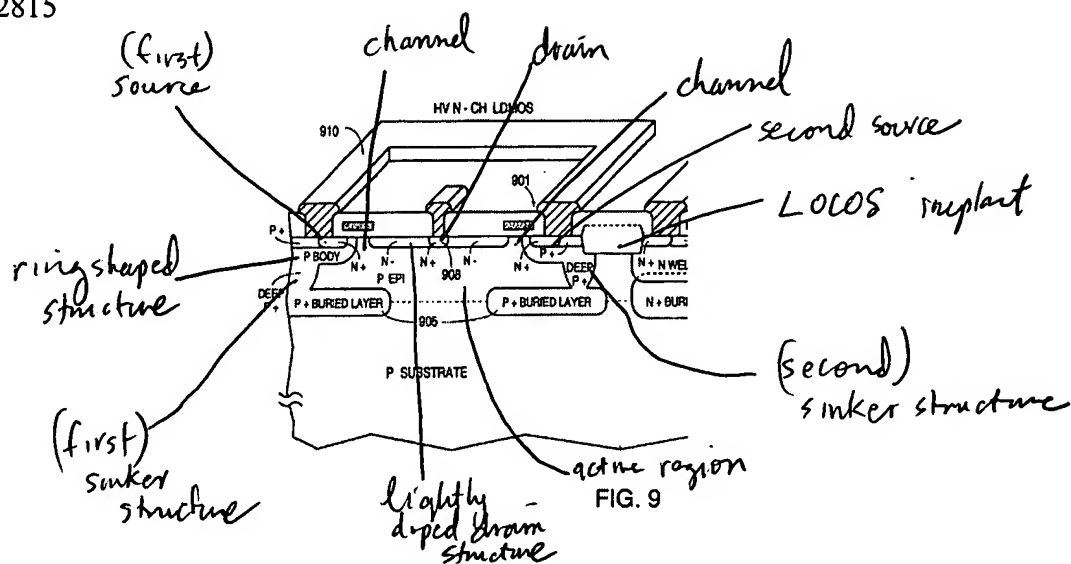
3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 thru 4, 6, 11 thru 13, 16, 18 thru 21, 23, 25 thru 27, 30, 32 thru 35, 37, 39, 41, and 42 are rejected under 35 U.S.C. 102(b) as being anticipated by Williams et al. 5,386,136. Williams discloses (see, for example, FIG. 9) a semiconductor device comprising a p epitaxial region (active region of a first conducting type), transistor, and P-body (ring shaped region of the first conductive type). In column 8, lines 29-32, Williams discloses the P-body as being an annular structure (ring shaped).

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Regarding claims 2, 19, and 33, see N+ region (drain) 908, N+ region (source), channel, gate, and deep P+ region (sinker structure).

Regarding claims 4, 21, and 35, see N- region (lightly doped drain region) next to the N+ region 908.

Regarding claims 6, 20, and 34, see FIG. 9 above wherein two transistors share a N+ region (common drain) 908, have a first source region and a second source region each defining a channel and first and second deep P+ regions (first and second sinker structure).

Regarding claims 11, 25, and 39, see FIG. 9 above wherein a LOCOS implant encloses semiconductor device.

Regarding claims 12 and 26, see FIG. 9 above wherein a P substrate and P epitaxial layer.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 5, 7 thru 9, 22, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. '136 as applied to claims 1-4, 6, 11-13, 16, 18-21, 23, 25-27, 30, 32-35, 37, 39, 41, and 42 above, and further in view of Leong 6,372,557 B1. Williams does not disclose a metal layer on the backside of the semiconductor device. However, Leong discloses (see, for example, Fig 3L) a semiconductor device comprising a bottom side metalization layer (metal layer) 138. In column 4, lines 48-52, Leong discloses the bottom side metalization layer facilitates electrically grounding a substrate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have a metal layer on the backside of the semiconductor device in order to facilitate electrically grounding the substrate of a semiconductor device.

7. Claims 10, 15, 24, 29, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. 5,386,136. Williams discloses (see, for example, FIG. 9) a semiconductor device comprising a p epitaxial region (active region of a first conducting type), transistor, and P-body (ring shaped region of the first conductive type). In column 8, lines 29-32, Williams discloses the P-body as being an annular structure (ring shaped). Also, see paragraph 4 above. Williams does not disclose the ring being doped in the range of 10^{14} - $10^{15}/\text{cm}^2$. However, doping the ring in the range of 10^{14} -

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$10^{15}/\text{cm}^2$ is a result effective variable that ultimately determines the threshold voltage of a semiconductor device. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have the ring doped in the range of 10^{14} - $10^{15}/\text{cm}^2$ in order to determine the threshold voltage of the semiconductor device, and since it has been held that discovering an optimum value of a result effective value involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980).

8. Claims 14, 28 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. '136 as applied to claims 1-4, 6, 11-13, 16, 18-21, 23, 25-27, 30, 32-35, 37, 39, 41, and 42 above, and further in view of Chang et al. 6,624,030 B2. Williams does not disclose the ring being created by masked ion implant. However, Chang discloses (see, for example, FIGs. 6 and 7) a semiconductor device comprising a P diffusion ring 28 formed by a boron implant and photoresist (masked) 52. It would have been obvious to one of ordinary skill in the art at the time of invention to have the ring created by masked ion implant in order to form a ring adequately in a substrate.

9. Claims 17 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. '136 as applied to claims 1-4, 6, 11-13, 16, 18-21, 23, 25-27, 30, 32-35, 37, 39, 41, and 42 above, and further in view of Gajda et al. 6,780,714 B2. Williams does not disclose the ring comprising at least one gap. However, Gajda discloses (see, for example, FIG. 5) a semiconductor device comprising a P diffusion ring region 15a separated by gaps 14x. In column 8, lines 54-56, Gajda discloses the gaps having no

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substantial effect on the ring operation of region 15a. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have the ring comprising at least one gap since such a gap has no substantial effect on the operation of the semiconductor device and provides another way of efficiently forming the P-body.

INFORMATION ON HOW TO CONTACT THE USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee
August 28, 2004

A handwritten signature in black ink, appearing to be 'Eugene Lee', written in a cursive style.